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OF THE

AMERICAN CHEMICAL SOCIETY.

VOL. XIV.—NO. 5.

MAY,

1892.

COMMITTEE ON PAPERS AND PUBLICATIONS:

A. C. HALE,
J. F. GEISLER,
A. A. BRENEMAN, Editor.

ABSTRACTOR FOR AMERICAN PATENTS:

J. F. GEISLER.

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The **Journal of the American Chemical Society** appears monthly, except during July and August. It will contain all papers read before the Society, and a list of American Patents relating to Chemical Industries.

The Price of Subscription is $5.00 per year, in advance.

The Meeting Room of the Society is the Law Lecture Room, University Building, Washington Square, New York.

The Regular Monthly Meeting is held on the first Friday of every month, except July and August, at 8 P. M.

Corresponding Secretary:

A. C. HALE, 551 Putnam Ave., Brooklyn, N. Y.

Treasurer:

C. F. McKENNA, 426 E. 23d St., N. Y.

The Library of the Society in the Library Room of the University of the City of New York, is accessible daily, from 10 A. M. to 5 P. M., on Tuesday and Wednesday evenings, and on the evenings of the regular monthly meetings of the Society.

Back numbers of the Journal are sold to Members at $3.00, to others at $5.00, per volume. Apply to the Librarian,

C. E. MUNSELL, 100 Horatio St., N. Y.

The Committee on Papers and Publications respectfully call attention to the resolutions of the Society, requiring that papers be submitted to the Committee before being read.

Authors will be furnished, gratis, with 20 reprints of each article published in the Journal, *if application for the same be made when the article is sent.*

Members are requested to give notice of any change of address, or failure in the delivery of the Journal. All communications relating to the Journal should be addressed to the Editor.

A. A. BRENEMAN, 97 Water St., New York.

The meeting was called to order at 8:30 P. M., Prof. A. A. Breneman in the chair.

The minutes of the April meeting were read and accepted.

The following members were elected :

Prof. A. E. Menke, Industrial University, Fayetteville, Ark.
Dr. Leo Baekeland, 1964 Seventh Avenue, N. Y.
Dr. S. Burton, Waco, Texas.
Mr. John T. Enequist, Bushwick Chemical Works, Brooklyn, N. Y.
Mr. Roland Molineaux, 108 Fulton Street, N. Y.

From associate to regular membership:

Mr. Ottomar Eberbach.
Mr. Wm. F. Edwards, Ann Arbor, Mich.

The following nominations were made:

Dr. J. E. Blomeis, Landing, N. J.
Dr. Walker S. Haines, Rush Medical College, Chicago, Ill.
Dr. Wm. M. New, Washington, D. C.
Mr. Wm. H. Seaman, 1424 11th Street, Washington, D. C.
Ernst Speidel, B. Sc., 19 Quincy Street, Chicago, Ill.
Mr. W. M. Stiles.
Dr. Herman T. Vulté, School of Mines, N. Y.
Dr. Frederic Zinsser, 501 West 58th Street, N. Y.

The chair announced the death of Dr. A. W. von Hofmann, of Berlin, an honorary member of the Society.

The following message was received by cable and read by the Secretary :

"BERLIN, May 6, 1892.

"*To the Pres't and Council of the American Chemical Society:*

"In the name of the German Chemical Society, I have the sad duty to inform you of the death of our President, August Wilhelm von Hofmann.

(Signed) C. A. MARTINS, *Vice-Pres't.*"

Dr. Loeb moved that a committee of three be appointed to draft resolutions in regard to the death of Prof. A. W. von Hof-

mann, of Berlin, to be spread upon the minutes of the Society, and that a copy of these resolutions be sent to the Berlin Chemical Society.

Carried.

The chair appointed Dr. Morris Loeb, Dr. H. Carrington Bolton and Dr. A. R. Leeds.

It was also directed that an order be cabled to Berlin to place a wreath upon the coffin of Prof. Hofmann, in the name of the American Chemical Society.

After some discussion in reference to holding a general meeting of the Society in August, the meeting was adjourned.

DURAND WOODMAN,
Recording Secretary.

THE NEW YORK SECTION.

A special meeting of the New York Section for the purpose of organization was held at the University building, in the Law lecture room, April 29, 1892, at 8:15 P. M.

The committee on organization, appointed at the April meeting of the Society, presented through its chairman, Prof. McMurtrie, the following:

Rules for the Government of the New York Section of the American Chemical Society.

1. The officers of the Section shall consist of a Chairman, a Secretary and Treasurer (combined in one person), an Executive Committee, consisting of the officers above named, and three additional members of the Section.

2. The officers shall be elected annually by ballot after nomination in open meeting, in the first meeting of the year, which shall be held on the first Friday of October. Officers who shall serve for the remainder of the current year shall be elected in accordance with these provisions immediately after they shall have been adopted.

3. The Section shall hold nine meetings during the year, one upon the first Friday of each month except July, August and

September. Special meetings may be called at any time at the discretion and by order of the Executive Committee.

4. No papers may be read in open meeting until they have been approved by a majority of the Executive Committee.

5. The Treasurer shall annually report to the Executive Committee and his report and accounts shall be examined and audited by a committee of two to be appointed by the Chairman of the Section.

6. The Section shall be otherwise governed and controlled by the provisions of the general constitution of the Society.

The report of the committee was accepted and the rules were adopted as the laws of the New York Section.

An election for officers of the Section under the above rules was then held with the following result:

Chairman, A. H. Sabin; Secretary and Treasurer, Morris Loeb; members of the Executive Committee, H. C. Bolton, William McMurtrie, A. A. Breneman.

THE FIRST REGULAR MEETING OF THE SECTION.

The first regular meeting of the New York Section was held at the close of the regular May meeting of the Society, May 6.

A paper "on the application of graphic methods in certain chemical studies," by A. Bourgougnon, was read by the Secretary in the absence of the author.

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ON THE APPLICATION OF GRAPHIC METHODS IN CERTAIN CHEMICAL STUDIES.

By A. Bourgougnon.

The graphic methods so generally applied in the different branches of science possess the great advantage of representing physically to the eye laws deduced from the observation of certain phenomena or metaphysical conceptions, laws generally expressed by complicated equations of which the solution would involve impracticable calculations. In a general manner, the more complicated and difficult of conception by our mind is a physical law, the higher is the degree of the equation or empirical formula which embodies it. When applied to the study of the laws of gravitation for instance, to quote a well known example, this graphic method furnishes curves from which can be at once calculated by measurements on a diagram, the principal data of a given question. Transported to the domain of chemistry the method is found very useful for the solution of many problems.

The curve of solubility of certain salts of which the solubility varies with the temperature furnishes at once the amount of such salts in solution in water at different temperatures.

When saline solutions are used for certain specific purposes similar curves constructed from actual observations of the densities of different saturations or the degree they show with a given areometer, can give readily the amount of the salt to be dissolved in a certain amount of water to obtain the density required, or vice versa.

If we pass from these simple examples to curves representing certain conceptions of the intimate constitution of matter, the use of graphic methods proves equally advantageous.

A curve reproducing the results of certain observations may

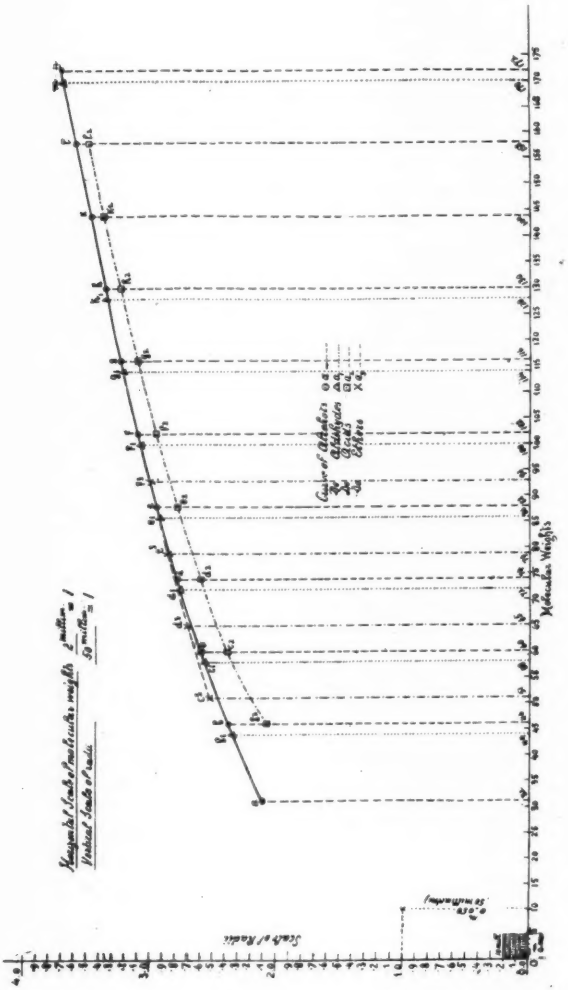
and will often present "breaks" or solutions of continuity, and a consideration of these missing parts may prove the means of discovering the probable properties of an unknown compound, which, graphically, would find its place at such a point. We may mention as an example the well known curve of Mendelejeff, embodying a classification of the elements. Without entering into a discussion of the question if this curve does really or not represent a natural classification of the elements, it is well known that by the consideration of some missing points of the curve, it has been possible for Mendelejeff to foresee that the "gap" observed at certain points would have to be filled by an element which, by its position between certain others of which the properties were known ought to possess certain characters of atomic weight, specific gravity, and even chemical affinities which the subsequent discovery of such an element has emphatically confirmed. In other cases these curves may serve as affording a corroboration, a control, of certain assertions generally admitted, and even if useful only to that extent, they would be very valuable. We have thought that in this line of investigation it might prove interesting to submit the results of some personal researches.

If the molecular weight W of a compound be divided by its specific gravity D, the quotient expresses the molecular volume of the compound

$$V = \frac{W}{D}$$

and this ratio of the molecular weight to the specific gravity can be easily computed in each particular case.

Of the nature of the atoms we do not know much, we are not in this respect any more advanced than the Greek philosophers were twenty centuries ago, we have no definite ideas of their shape, we do not know if their number is limited. We admit that under certain circumstances they can assume an individuality and form molecules which we consider as the smallest conceivable parts of matter which can pass into or out of combination ; we admit also, that these molecules affect the spherical form, from which it can be inferred that a compound constituted by such molecules separated by intermolecular spaces will affect also a spherical form.


Horizontal Scale of Acid Strength
Vertical Scale of Acid
Molecular Weights
Scale of Bases
Scale of Acids

The graphic consideration of these molecular volumes for certain class of compounds give rise to interesting deductions. If, for instance, we consider the primary alcohols and their derivates, aldehydes, acids, ethers, we know that, in each series of these compounds, the molecular weights proceed by regular and equal increments by the addition to the preceding term of the series of the molecular weight of the radicle which heads it. If we carry then on a horizontal line, taken as the axis of abcissae and at a proper scale, these equal increments from an assumed point O, and applying to each compound the proper molecular weight W, represented by a corresponding abcissa, we erect at each point, thus determined in the axis AX of abcissae, a perpendicular; by carrying on these ordinates the lengths measured at the same or any other scale assumed, for clearness of diagram, which represent the calculated molecular volumes V in each case and joining the points by a continuous curve we will obtain a curve which will be the graphical representation of the law by which, so to speak, we pass from one compound to the other. If it happens that certain of these compounds be unknown, the curve at the corresponding point (or the ordinate) will present a "gap," but the general curvature assumed will allow us to trace it, with a sufficient approximation, by joining the points corresponding to the term or terms of the series preceding and following the missing compound or compounds and we shall be able, by actual measurements of the missing ordinates thus supplied, to foresee very closely the physical characters of the missing term.

These molecular volumes being generally represented by numbers rather large may render the construction of the diagram on a scale sufficiently large rather difficult. They can be advantageously replaced by such quantities, proportional to them, as can be readily calculated, the volumes being known, for instance, the corresponding radii of the spheres which represent the molecular volumes.

We have then

$$\frac{W}{D} = V = \frac{4\pi}{3} R_3$$

and

$$R = \sqrt[3]{\frac{V}{4.1888}}$$

We have calculated such radii for the primary alcohols, their ethers, aldehydes and acids for the compounds of which the molecular weights W and specific gravities D are given below, calculating and tabulating first the molecular volumes from which the corresponding radii were deduced, and for each series or group of compounds we have constructed the special corresponding curve by carrying, as explained above, as abcissae the respective molecular weights in each case and as ordinates at each point thus determined on the line of abcissae the calculated radii of the spheres corresponding to the different molecular volumes.

ALCOHOL.

	W	D	$V=\frac{W}{D}$	$R=\sqrt[3]{\frac{V}{4.1888}}$
$C\ H_4O$	32	0.8098	39.5159	2.112
C_2H_6O	46	0.812	56.6502	2.382
C_3H_8O	60	.820	73.170	2.593
$C_4H_{10}O$	74	.824	89.805	2.778
$C_5H_{12}O$	88	.83	106.204	2.939
$C_6H_{14}O$	102	.8312	122.7141	3.082
$C_7H_{16}O$	116	.838	138.4248	3 209
$C_8H_{18}O$	130	.8375	155.2238	3.333
$C_9H_{20}O$	144	.8415	171.1229	3.444
$C_{10}H_{22}O$	158	.8389	188.3418	3.555
$C_{11}H_{24}O$	172	.8268	208.0430	3.675

ALDEHYDES.

$C\ H_2O$ Gas.				
C_2H_4O	44	.807	54.5229	2.351
C_3H_6O	58	.83	69.8795	2.555
C_4H_8O	72	.834	86.3309	2.741
$C_5H_{10}O$	86	.822	104.6228	2.923
$C_6H_{12}O$	100	.842	118.7648	3.057
$C_7H_{14}O$	114	.827	137.8476	3.204
$C_8H_{16}O$	128	0.82	156.0975	3.340
$C_9H_{18}O$?				
$C_{10}H_{20}O$?				
$C_{11}H_{22}O$	170	.85	200.00	3.627

ACIDS.

$C H_2 O_2$	46	1.245	36.9477	2.066
$C_2 H_4 O_2$	60	1.0701	56.0695	2.374
$C_3 H_6 O_2$	74	1.0154	72.8776	2.591
$C_4 H_8 O_2$	88	0.9746	90.2934	2.783
$C_5 H_{10} O_2$	102	.9562	106.6722	2.941
$C_6 H_{12} O_2$	116	.9446	122.8033	3.083
$C_7 H_{14} O_2$	130	.935	139.0374	3.213
$C_8 H_{16} O_2$	144	.9139	157.5664	3.350
$C_9 H_{18} O_2$	158	.9082	173.9704	3.463

ETHERS.

$C H_3 O_{\frac{1}{2}}$ Gas.				
$C^2 H_5 O_{\frac{1}{2}}$	37	.735	50.3401	2.290
$C_3 H_7 O_{\frac{1}{2}}$	51	.763	66.8414	2.517
$C_4 H_9 O_{\frac{1}{2}}$	65	.784	82.9081	2.704
$C_5 H_{11} O_{\frac{1}{2}}$	79	.799	98.8735	2.846
$C_6 H_{13} O_{\frac{1}{2}}$	93	.862	107.8886	2.953

The specific gravities are for the temperature of 0°C. and have been obtained from Prof. Clarke's "The Constants of Nature." Instead of writing the formulæ of the ethers $\begin{matrix} CnH_{2n+1} \\ CnH_{2n+1} \end{matrix}\rangle O$ their molecule has been halved so as to obtain volumes comparable with the volumes given by the alcohols, aldehydes and acids, and this has been done only as a matter of convenience in calculation, bearing in mind, however, that the formulæ represents only half a molecule which, according to present chemical theories, cannot exist.

In the series of the aldehydes we have omitted the methylic aldehyde which is a gas, beginning the curve only at the next liquid compound. The aldehydes $C_9 H_{18} O$, $C_{10} H_{20} O$ are unknown at these points, the curve is supplied from the general radius of curvature it assumes. The interpolated curves would furnish at once very approximately the corresponding ordinates, and by measuring these ordinates on the scale the radii of the spheres, representing the molecular volumes could be obtained. From these radii the molecular volumes could be readily calculated, and

as the abcissae corresponding to the measured ordinates are known and furnish the molecular weights, the specific gravity $D=\frac{W}{V}$ could be obtained. The properties of these unknown aldehydes could be also inferred from the fact of their falling between two of which the properties have been already ascertained. In the same manner the curve might serve as control for results already obtained; any important deviation from the general curvature at some point corresponding to a new compound, which might have been furnished by an ordinate calculated as explained, would justify a revision of the results accepted for this compound, of its specific gravity for example.

An inspection of the diagram in which all the curves have been plotted on the same scale show how closely the alcohol and aldehyde curves especially and even that furnished by the ethers follow each other; practically they cover each other and give one and the same curve if we consider how large the vertical scale has been taken in proportion to the horizontal one; in this diagram it is twenty-five times as large and any discrepancy shows itself much magnified. The curve of the acids is decidedly different and falls below the others, but keeping in mind always the large vertical scale adopted it follows still closely the other in general curvature though apparently nearing them as it recedes from the origin.

This rapid examination of one particular class of compounds may serve to show the utility of graphic methods in pointing the way to the discovery of some errors in the determination of certain properties of a compound or in calling the attention on certain anomalies made apparent, so to speak, in a physical manner.

In pursuing this line of investigation in a summary manner, if we compare together the elements taken in the gaseous state under a condensation of 2 volumes and calculate the radii of their molecular volumes as explained above we obtain a curve which demonstrates graphically the known fact that under these condition the elements occupy in space the same volume.

$O_2 = R\ 1.904$
$H_2 = R\ 1.902$
$N_2 = R\ 1.902$

$Cl_2 = R\ 1.908$
$Br_2 = R\ 1.903$
$I_2 = R\ 1.909$
$S_2 = R\ 1.902$

If we calculate in the same manner the radii of the spheres representing the molecular volumes of gaseous compounds, we find

$NH_3 = R\ 1.900$ 2 volumes
$H_2O = R\ 1.904$
$CO_2 = R\ 1.900$
$SO_2 = R\ 1.898$
$SO_3 = R\ 1.904$
$CO = R\ 1.904$
$AsH_3 = R\ 1.904$
$PH_3 = R\ 1.899$
$2\ (CH_3) = R\ 1.904$
$2\ (C_2H_5) = R\ 1.891$
$CS_2 = R\ 1.900$

$$\begin{matrix} -Me \\ N-H \\ -H \end{matrix} = R\ 1.899$$

All these numbers are practically equal, and, in fact, the differences observed are so small that they might be due to errors of observation. The curve which will represent these molecular volumes, as given by their radii, is, in fact, a straight line parallel to the axis of abcissae at a distance of 1.90, all the ordinates being equal.

With this constant radius equal to 1.90, we can calculate the hypothetical specific gravity in the gaseous state of bodies that we cannot volatilize, carbon, for example.

The formula

$$\frac{4\pi}{3} R^3 = V$$

gives

$$1.9^3 = 6.859 \times 4.1888 = 28.7309$$

and

$$\frac{W}{V}=D$$

$$\frac{24}{28.7309}=0.835$$

Büchner gives the number 0.8316.

There are, however, some exceptions.

Mercury, taken as equal to two volumes of vapor, will give 2.392 for the number corresponding to its radius; but if we reduce the two volumes to one, we will have

$$Hg''=R\ 1.898$$

For phosphorus and arsenic the nearest numbers to the constant 1.90 are obtained with

$$P_4=R\ 1.895$$
$$As_4=R\ 1.890$$

Therefore as 1 atom of mercury occupies the same volume as 2 atoms of hydrogen, the atom of mercury is twice the bulk of an atom of hydrogen and the atom of phosphorus and of arsenic in the vapor state occupies only one-half the bulk of an atom of hydrogen.

Since this paper has been read before our Society, I have found a very able and very interesting communication from Mr. A. J. Rossi in the "Iron Age." In this paper Mr. Rossi, in adapting the use of a graphic method, shows that, knowing the analysis of an iron ore, a lime stone and the amount and composition of the ash contained in the fuel to be employed, the charges of a blast furnace corresponding to a certain grade of iron and consequently to a slag of a given composition and fusibility can be obtained without calculation.

CONSTRUCTION OF THE DIAGRAM.

The use of profile paper ruled to the millimeter is very convenient for such diagrams.

We have carried the molecular weights on the line of abcissae at a scale of two millimeters for one of molecular weight and the

paper being divided to the millimeter we could even estimate a fractional number very closely.

The vertical scale has been taken equal to twenty-five times the horizontal scale, fifty millimeter vertical representing a radius of 1, five millimeter a radius of 0.1 and every millimeter a radius of 0.02. As we can accurately estimate one-half of the smallest division of the paper we see that the radius can be read exactly to the second decimal. To render the construction of each curve easier to understand we have plotted the ordinates or radii of all the points determined in distinct lines down to the line of abcissae, marking at the foot of each ordinate the abcissae or molecular weight which correspond to it in the tables.

Abstracts of American Patents Relating to Chemistry.

(*From the U. S. Patent Office Gazette.*)

Issued May 3, 1892.

473,928.—Process of dyeing black. Meinhard Hoffmann, Mainken, near Frankfort-on-the-Main, Ger.

The material is first dyed with the coloring matter named "naphthaline violet" and then treated with nitrous acid, and finally passed through a solution of phenol or an amine.

473,957.—Coal washing and separating machine. James Pollock, Wilkesbarre, Pa.

474,005.—Rotary drying machine. Richard E. Fischer, Baltimore, Md.

474,014.—Gold concentrator. William H. Hill, Atlanta, Ga.

474,019.—Apparatus for wasting and smelting. Robert H. Lanyon, Nevada, Mo., and William Lanyon, Pittsburg, Kan.

474,022.—Process of separating and cleaning coal and other minerals. Carl Lührig, Dresden, Ger.

474,023.—Apparatus for washing, separating and concentrating ores of different specific gravity. Carl Lührig, Dresden, Ger.

474,034.—Air compressor. Benjamin F. Teal, Chicago, Ill.

474,035.—Atomizer. Victor C. Vant Woud, Brooklyn, N. Y.

474,036.—Funnel. Alhana P. Wood, Atlanta, Ga.

474,044.—Machine for filling and corking bottles. Henry Heartfield, Croydon, Eng.

474,052.—Fiber preparing machine. John L. Acosta, Vera Cruz, Mexico.

474,063.—Atmospheric gas burner. Charles M. Lungsen, Brooklyn, N. Y.

474,087.—Machine for drying textile fiber. William Hartley, Jr., Lonsdale, R. I.

474,095.—Ore pulverizer. William L. Morris, Cleveland, Ohio.

474,099.—Method of preparing figs. George W. Reamer, Forest Hill, Cal.

The figs are subject to the action of steam to soften and clean them and after expression of part of the juice reduced to any suitable form.

474,119.—Glass grinding machine. Robert Friedel, Stuttgart, Ger.

474,135.—Safety appliance for steam boilers. John Kastner, Jr., Evansville, Ind.

474,160.—Separator for purifying steam. David Cochrane, Philadelphia, Pa.

474,178.—Gas generating apparatus. William H. Morgans, Pontiac, Mich.

474,201.—Apparatus for making gas. Paul A. N. Winand, Philadelphia, Pa.

474,202.—Gas producer. Paul A. N. Winand, Philadelphia, Pa.

474,241.—Water or gas meter. John Goodman and Henry Goodman, Louisville, Ky.

474,253.—Composition of matter for spinning rings, etc. Rose A. Johnson, Manchester, and Robert Brewster, New Barnet, Eng.

The composition consists of fifty parts feldspar, fifty parts rock crystal, thirty parts china clay, and thirty parts of a flux, such as borax.

474,267.—Microscopic sediment filter. Porter W. Shimer, Easton, Pa.

474,272.—Ore concentrator. Crighton R. Townsend, Idaho Springs, Col.

474,295.—Anti-friction alloy. John Fowler, Louisville, Ky.

An alloy of antimony, copper and phosphor-tin is first prepared and then fused with block tin.

474,305.—Drier. James G. Sanderson, New York, N. Y.

474,326.—Siphon bottle filling machine. Frederic J. Johnson, Cambridge, and George E. Barton, Somerville, Mass.

474,344.—Apparatus for generating heat. Henry A. Ramsay, Baltimore, Md.

Issued May 10, 1892.

474,354.—Middlings purifier. Seth H. Baker and James H. Verity, Rapidan, Minn.

474,389.—Centrifugal machine. Hugh W. Lafferty, Wilmington, Del.

474,412.—Machine for forming fuel bricks. Johann P. Schmidt, Jersey City, N. J.

474,413.—Art of and apparatus for aerating liquids. Joseph Schneible, Brooklyn, and Carl A. Schneible, New York, N. Y.

474,414.—Apparatus for aerating liquids. Carl A. Schneible, New York, and Joseph Schneible, Brooklyn, N. Y.

474,419.—Process for making fertilizers. Thomas M. Smith, Baltimore, Md.

474,434.—Paint oil. George W. Bankers, Brooklyn, N. Y.

A paint oil composed of a solution of naphthaline in fish oil.

474,443.—Alloy. Ernest W. Cooke, Chicago, Ill.

An alloy of iron, aluminium and copper and containing at least 75% of iron.

474,446.—Apparatus for pickling meat. Johann Fey, Offenbach-on-the Main, Ger.

474,454.—Exciting fluid for galvanic batteries. Carl Lütze, Jr., Berlin, Ger.

A concentrated solution of one or several of the chlorides of copper, iron, zinc, etc., in combination with two to three parts by weight of nitrate of mercury.

474,481.—Gas regulator. Michael O'Gorman, Jersey City, N. J.

474,490.—Dust collector. George Walter, Duluth, Minn.

474,491.—Dust collector. George Walter, Thief River Falls, Minn.

474,496.—Apparatus for molding earthenware, etc. Joseph Crossley, Trenton, N. J.

474,510.—Bottle washing machine. Jacob F. Wittemann, Fort Hamilton, N. Y.

474,513.—Machine for combing fiber. David Barnett and David Black, Bradford, Eng.

474,527.—Sulphuric acid pan and process of making the same. Richard Küch, Hanau-on-the-Main, Germany.

Platinum is heated to a degree higher than the melting point of gold and then molten gold is poured upon the same, thus alloying the two surfaces and coating the platinum with a layer of gold.

474,529.—Manufacture of explosives. Frank Roller, West Berkeley, Cal.

Nitrates or other gas producing compounds or materials are covered with a coating of colophony in an oil.

474,531.—Process of roasting coffee. Carl Salomon, Brunswick, Ger.

The coffee is first exposed directly to contact with gases heated to a high temperature until the empyreumatic matters are driven off and the aromatic qualities developed as indicated by the alkaline reaction of the escaping gases. The wasted material is then quickly cooled.

474,539.—Process of and apparatus for making silicates and hydrochloric acid. Walter Walker, Eng.

Sand is mixed with chloride of sodium and lime and the mass subjected to sufficient heat in the presence of moisture to form a silicate of soda and lime and to drive off the hydrochloric acid.

474,542.—Thermostat. Archibald H. Brintnell, Toronto, Can.

474,561.—Apparatus for the manufacture of explosives. Hiram S. Maxim, London, Eng.

474,567.—Process of galvanizing or tinning wire cloth. Charles B. Rumsey, Homer, N. Y.

474,573.—Ore roasting furnace. Horace F. Brown, Butte City, Mont.

474,581.—Process of preserving meat. José Mariosa, San Paulo, Brazil.

The meat is coated with a mixture consisting of about forty parts bicarbonate of soda and sixty parts of sugar and sufficient water to form a pasty mass and subjected to an air current to thoroughly dry the coating applied.

474,585.—Art of cleaning and washing raw sugar.

474,591.—Process of extracting gold from sulphide ores. Thomas A. Edison, Llewellyn Park, N. J.

474,592.—Ore conveying apparatus. Thomas A. Edison, Llewellyn Park, N. J.

474,630.—Apparatus for cooling and aerating malt liquors. Henry E. Deckebach, Cincinnati, Ohio.

474,631.—Low water alarm. Thomas A. Delaney and Robert E. Hills, Chicago, Ill.

474,636.—Mechanism for testing and recording the properties of flour. James Hogarth, Kirkcaldy, Scotland.

474,637.—Machine for making vessels from fibrous pulp. Eber Hubbard, Chicago, Ill.

474,685.—Water purifier. Arthur Pennell, Kansas City, Mo.

474,693.—Paint. Charles H. Reaney, Washington, D. C.

A paint consisting of "zinc oxide, red lead, drop ivory-black, pulverized slate, raw linseed oil, spirits of turpentine, oxide drier, bisulphide of carbon and pure rubber."

474,702.—Composition for leather dressing. James E. Swain, Baltimore, Md.

474,714.—Fiber machine. Luis Bacallado y Sanchez, Matanzas, Cuba.

474,716.—Machine for creasing powder-papers. Alfred G. Beale and Thomas Nesbitt, Tunbridge Wells, Eng.

474,778.—Process of making nitro-cellulose. Hudson Maxim, New York, N. Y.

Issued May 17, 1892.

474,807.—Continuous Kiln. Max R. Boehucke, Centinela, Cal.

474,811.—Baking powder. Charles A. Catlin, Providence, R. I.

A preparation composed of phosphoric acid in granular form and bicarbonate of soda.

474,814.—Process of preparing celluloid or similar materials for printing. Arthur A. C. de Coëtlogon, Paris, France.

474,828.—Medical battery. Philip Hathaway, New York, N. Y.

474,829.—Process of concentrating ores. Charles B. Hebron, Denver, Col.

474,834.—Non-conducting material. Henry W. Johns, New York, N. Y.

Composed of hair, asbestos, sponge and a disinfectant or insect destroying material.

474,834.—Carburetor. John W. Lambert, Ohio City, Ohio.

474,850.—Process of producing photographs on hard surfaces. Armand Müller Jacobs, New York, N. Y.

474,864.—Process of treating cottonseed oil. George W. Scollay, New York, N. Y.

Ochre is dried and then brought into intimate contact with the oil and finally separated from the refined oil. The ochre separating and carrying the impurities.

474,865.—Composition for use as ornamental moldings, etc. Oscar von Slama, Jersey City, N. J.

A plastic composition containing dextrine, sulphate of lime, silicate of soda, and vegetable fibers.

474,880.—Centrifugal machine for emulsifying liquids. George W. Towar, Jr., Detroit, Mich.

474,922.—Brick kiln. Stephen J. Plant, Momence, Ill.

474,933.—Furnace for the incineration of garbage. John Wilson, New York, N. Y.

474,942.—Manufacture of yeast. Jacob Blumer, Brooklyn, and Charles Schlagenhaufer, New York, N. Y.

474,943.—Method of making yeast. Jacob Blumer, Brooklyn, and Charles Schlagenhaufer, New York, N. Y.

474,944.—Process of making paper pulp. Norman H. Brokaw, Kankauna, Wis.

Sticks of wood are steamed or steeped to remove the resin and then cut into disks or chip and submitted to the action of sulphite liquor.

474,957.—Rheostat. Albert B. Herrick, Bayonne, N. J.

474,961.—Apparatus for heating and circulating water. Henry A. Jones and Joseph E. Marcy, New York, N. Y.

474,965.—Bottle filling machine. Willoughby M. McCormick, Baltimore, Md.

475,025.—Purifying and manufacturing saccharine solutions. Moriz Weinrich, St. Louis, Mo.

475,050.—Chemical fire extinguisher. Russell A. Ballou, Boston, Mass.

475,060.—Revolving waster. Rudolph Köhler. Lipine, Germany.

475,062.—Carbon product. Louis S. Langville, Troy, N. Y.

A product made "from the wood-cellulose and resinoid residuum of wood pulp manufacture, and in which the bulk of the silica of the wood-cellulose has been removed and the lighter carbon produced from the resinoid combined with the denser carbon of the wood-cellulose."

475,063.—Pulp beating and refining machine. Edward R. Marshall, Turner's Falls, Mass.

475,065.—Dyeing apparatus. Andrew Reid, Amsterdam, N. Y.

475,070.—Melting furnace. Clarence L. Wheeler, Marion, Ind.

475,122.—Apparatus for sterilizing milk. Franz Krämer, New York, N. Y.

475,225.—Centrifugal machine. Robert D. Weaver, Washington, D. C.

475,229.—Art of dyeing wool. James A. Young, Boston, Mass.

475,255.—Rheostat. Walter A. Sterling, Denver, Col.

475,260.—Method of and apparatus for deoxidizing metals. Montgomery Waddell and Justus B. Entz, New York, and William A. Phillips, Brooklyn, N. Y.

475,267.—Brick kiln. Anton Dimpfl, Munich, Ger.

475,284.—Crushing mill. Charles E. Philes, Stockton, Cal.

Issued May 24, 1892.

475,330.—Stone crusher. George Lowry, Northampton, Eng.

475,335.—Manufacture of electrodes for secondary batteries. James F. McLaughlin, Philadelphia, Pa.

475,347.—Ore crusher. Frank A. Ross, Chicago, Ill.

475,351.—Metallurgical furnace. Carl Siemens, St. Petersburg, Russia.

475,355.—Welding compound. Hooper B. Straut, Lincoln, Neb.

A composition compounded of borax, one pound; tripoli, one pound; muriate of ammonia, four ounces; prussiate of potash, one ounce; soda ash, five ounces; white sand, five ounces; soft water, one quart.

475,360.—Amalgamator. James M. Thompson, San Francisco, Cal.

475,372.—Process of developing photographic pictures. Momme Andrésen, Berlin, Ger.

475,381.—Carbureted-hydrogen-gas generator and burner. John W. Blake and Joseph G. Sackett, Kansas City, Mo.

475,382.—Composition of matter and method of producing the same. Craft C. Carroll, New York, N. Y.

An alloy of silver, tin, copper and aluminium.

475,395.—Process of recovering grease, etc., from wool washings. Roger B. Griffin, Auburndale, Mass.

475,398.—Furnace for iron working. William Heckert, William J. Thomas and Frank L. Heckert, Findlay, Ohio.

475,402.—Process of obtaining metallic zinc from zinc sulphite by electrolysis. Theodor Lange, Brieg, Ger.

475,413.—Compound for cleaning and scouring. Chas. H. Peterson and Orlando C. Ruge, St. Louis, Mo.

A compound containing "water, aqua ammonia, alcohol, sulphuric her, glycerine, cocoanut oil soap and quillaia bark."

475,433.—Brick kiln. Max A. T. Boehncke, Centinela, Cal.

475,437.—Extracting perfumes. Robert A. Chesebrough, New York, N. Y.

475,454.—Coated metal pipe and method of manufacturing the same. William Lacy, Jr., Los Angeles, Cal.

475,471.—Pulverizing machine. Axel Sahlin, New Brighton, N. Y.

475,478.—Hydro-carbon oil burner for furnaces. John Wilson, New York, N. Y.

475,483.—Clay reducer. Walfrid Burkman, San Francisco, Cal.

475,498.—Process for rendering iron, steel and other similar metals homogeneous. Joseph C. Fraley, Philadelphia, Pa.

475,513.—Temperature regulator. James F. McElroy, Albany, N. Y.

475,522.—Apparatus for separating matter from slag. Dennis Sheedy, Denver, Col.

475,528. } Rheostat. Charles Willms, Baltimore, Md.
475,529. }

475,540.—Apparatus for discharging gas-retorts. André Coze, Paris, France.

475,547.—Deodorizing device. Edward O. Ely, Boston, Mass.

475,548.—Beer cooler. William W. Ferguson, Bloomdale, Ohio.

475,551.—Process of ungumming and decorticating textile material. Charles Girard, Paris, France.

The fibers are first treated with potassium manganate, then washed and treated to a bath of sulphurous acid and again washed.

475,557.—Ore sampling device. Robert C. Hawley, Pueblo, Col.

475,558.—Process of treating matter and ores. Henri L. Herrenschmidt, Petit Querilly, France.

475,574.—Apparatus for manufacturing salt. Charles F. Lawton, Arthur W. Lawton and Albert L. Lawton, Rochester, N. Y.

475,575.—Apparatus for the manufacture of salt. Charles F. Lawton, Arthur W. Lawton and Albert L. Lawton, Rochester, N. Y.

475,576.—Process of manufacturing salt. Charles F. Lawton, Arthur W. Lawton and Albert L. Lawton, Rochester, N. Y.

475,577.—Salt. Charles F. Lawton, Arthur W. Lawton and Albert L. Lawton, Rochester, N. Y.

475,586.—Process of solidifying liquid acids. Philip Mauro, Washington, D. C.

475,587.—Diffusion battery. George A. Mersick, Wilmington, Del.

475,602.—Apparatus for drying spent grain and the like. Friederich E. Otto, Dortmund, Germany.

475,609.—Copper smelting furnace. Benjamin Richards, Middle Bank, Swansea, Eng.

475,616.—Induline dye. Robert Senger, New York, N. Y.

Prepared by mixing one molecule of induline with three molecules of oleic acid, and then heating the mixture to about 100° to 120° centigrade. An intensely black liquid of the consistency of castor oil, insol. in water, soluble in alcohol and benzine.

475,637.—Apparatus for evaporating brine. Theodore R. Timby, Washington, D. C.

475,670.—Process of purifying sewage. Francis R. Conder, Guilford, England.

475,713.—Compound for waterproofing. James Stewart, Philadelphia, Pa.

475,725.—Process of tempering and hardening metals. Joseph S. Durning, Emsworth, Pa.

475,728.—Apparatus for charging machines with liquified gas. Paul Gifford, Paris, France.

475,737.—Chemical compound for treating tobacco. George S. Yingling, Tiffin, Ohio.

The compound consists of gallic acid, tannic acid, extract of geranium and extract of licorice.

Issued May 31, 1892.

475,757.—Process of recovering glycerine and salt from spent soap lye. Albert Dorneier and Otto C. Hagemann, London, Eng.

475,758.—Process of recovering crude glycerine from spent soap lye. Albert Dorneier and Otto Hagemann, London, Eng.

475,774.—Apparatus for conducting and screening gases from metallurgical furnaces. Malvern W. Iles, Denver, Col.

475,779.—Grain separator. James M. King, Rochester, Minn.

475,784.—Apparatus for boiling soap. Joel W. Martin, Hartford, Conn.

475,794.—Machine for decorticating fiber-bearing plants. John Von Oven and Charles F. Pankinn, Charleston, S. C.

475,795.—Apparatus for condensing steam. William E. Prall, Washington, D. C.

475,797.—Secondary battery electrode and process of making the same. Anthony Reckenzanne, London, Eng.

475,819.—Flax and hemp brake. John T. Smith, Heron Lake, Minn.

475,824.—Process of roasting ores. Charles W. Stickney, Butte City, Mont.

The process "consists in injecting steam at a red or higher heat into a furnace containing ore, whereby sulphuretted hydrogen is generated, and roasting another portion of ore by means of air, whereby sulphurous acid gas is generated, and mingling these gases in contact with water holding clay in suspension, whereby sulphate of alumina is generated and its solution mingled with the gases."

475,853.—Process of manufacturing beer. Christian Feigenspan, Newark, N. J.

475,856.—Fruit press. Samuel Grossman, Chicago, Ill.

475,876.—Automatic smoke consuming furnace. Michael J. Lynn, Rochester, N. Y.

475,897.—Fireworks. Carl Schmidt, Berlin, Germany.

A composition for star fireworks, consisting of steel chips, charcoal, nitrate of lead, shellac and spirits.

475,898.—Rheostat. Frederick W. G. Schneider, Toronto, Canada.

475,907.—Process of refining silver sulphides. William G. Waring, Silver City, N. Mex.

475,915.—Process of preparing clay. Phineas Arnold, Canal Dover, Ohio.

475,961.—Rectifying apparatus. Bogdan Hoff. Jaroslan and Julius Frommel, Parolosian, Austria-Hungary.

475,972.—Carburetor. Edgar B. Badlam, San Francisco, Cal.

476,035.—Apparatus for cleaning and concentrating ores. William Clancy, Anaconda, Mont.

476,073.—Still and process. Philip Rodes, Greenfield, Va.

476,091.—Process of purifying metals. Benjamin Talbot, Chattanooga, Tenn.

476,092.—Process of refining metals. Benjamin Talbot, Chattanooga, Tenn.

476,093.—Tester for spirituous liquors. Kenner Taylor, Frankfort, Ky.

476,095.—Apparatus for calibrating water meters. John Thompson, Brooklyn, N. Y.

476,096, 476,097, 476,099, 476,100. Proportional water meters. John Thompson, Brooklyn, N. Y.

476,098.—Method of and apparatus for maintaining a proportional flow of fluids through separate chambers. John Thompson, Brooklyn, N. Y.

476,103.—Positive proportional meter.
476,104.—Proportional water meter.
476,102.—Disk water meter.
John Thompson, Brooklyn, N. Y.

476,160, 476,161. Machines for testing fibrous plants. James L. Myers, New Orleans, La.

476,166.—Dry Closet. Willis D. Over, Bryan, Ohio.

476,177.—Hydrocarbon burner. Edward J. Thompson, Antrim, N. H.

476,231.—Purifier and separator. Jonathan Mills, Columbus, Ohio.

J. F. G.